

## CASE REPORT

# Child's play – an unforeseen complication of surgical emphysema

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## Abstract

Surgical emphysema is as an iatrogenic complication whereby air is dispersed within the tissues following an invasive procedure. It is relatively uncommon, however, it has been recognised that dental extractions and the use of air turbine drills can result in this complication. Here, we discuss a case report of a 35-year-old male re-attending with extensive surgical emphysema following a seemingly uncomplicated dental extraction, caused by playing with his baby. This case was unusual because no dental air turbine drill was used during the dental extraction, and due to the innocuous patient activity that caused the emphysema. Consideration of the aetiology, prevention and recognition of surgical emphysema are discussed.

## Introduction

Surgical emphysema is a known but uncommon complication associated with dental extraction. It is caused by air moving from a surgical site into the tissues and through the fascial planes. It can result from trauma or invasive surgery, and in some cases self-inflicted injury<sup>1</sup>. In dentistry, it is often associated with poor practice, where dental air turbine drills are used during oral surgical procedures, which can force air, microorganisms and debris into the tissue<sup>2–6</sup>. This most commonly occurs in lower molar extractions due to the apices being in close relation to the submandibular spaces<sup>4</sup>. Depending on the anatomical location and extent of the spread of air, it may lead to serious health consequences. It is well-recognised that air can spread to the mediastinum and parapharyngeal spaces<sup>7</sup>. The condition typically resolves itself, however, the risk of infection and airway obstruction can be life threatening<sup>5,8</sup> and therefore the prompt identification and management of surgical emphysema are vital.

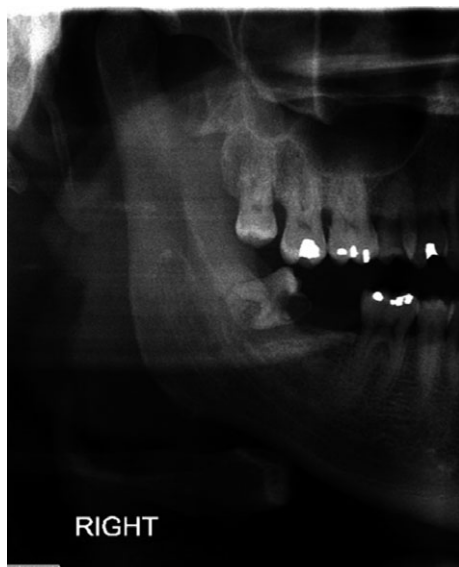
This case describes a patient who attended for a routine dental extraction of the lower right third

molar (LR8) and later the same day presented with surgical emphysema spanning from the right temporal fossa, tracking down the fascial planes of the neck, with gas in the retropharyngeal space to the right supraclavicular fossa. Earlier, during the extraction, a buccal flap was raised and the tooth was elevated uneventfully, with no bone removal and no use of a drill. In this case, the patient was playfully blowing air against his baby's abdomen (blowing raspberries), which caused the surgical emphysema after the dental extraction.

## Case report

The 35-year-old male patient was fit and well. He presented to the Oral Diagnosis Department at Liverpool University Dental School with dental pain associated with a periapical periodontitis of the LR8 (Figure 1). After discussing treatment options the patient opted for extraction of the LR8, which was performed by a dental student under direct supervision. This involved a buccal flap being raised, no bone removal was required and the tooth was

elevated uneventfully. The patient was subsequently sent home with routine post-operative instructions. The patient returned later that day with a sudden acute cervicofacial swelling, some mild discomfort on swallowing and a change in pitch to his voice (Figure 2). He stated that following the dental extraction he had returned home and 'blown raspberries' on his infant's stomach. This caused a sudden pain and swelling. Clinically, crepitus could be heard on



**Figure 1** Right half orthopantomograph showing evidence of caries and peri-apical pathology associated with the lower right last standing molar.



**Figure 2** Patient presenting later with acute cervicofacial swelling.

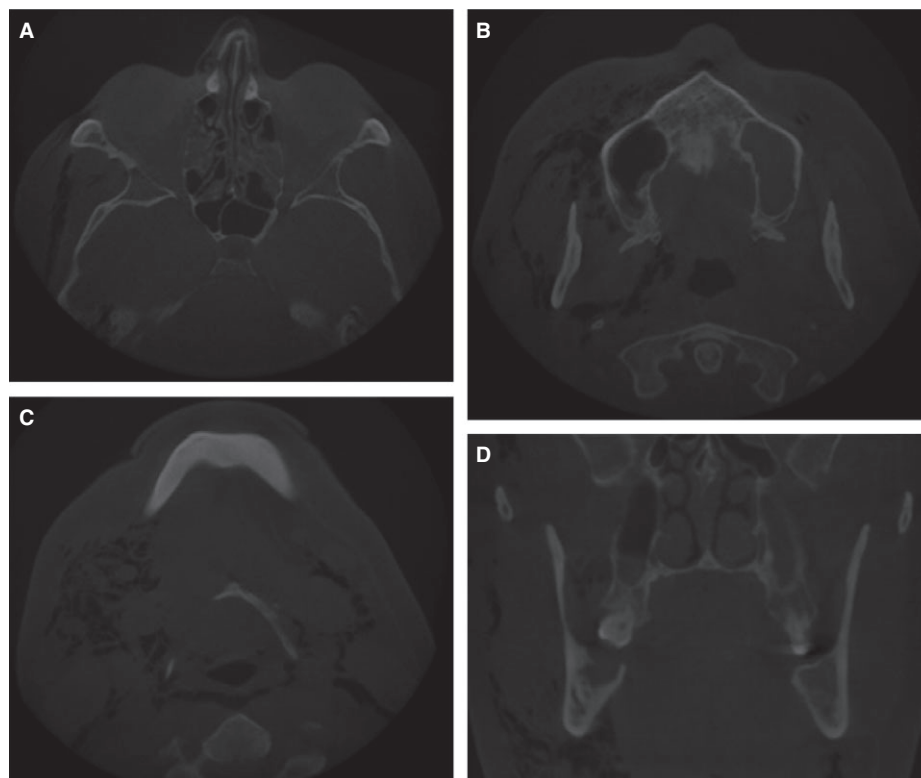
palpation, which is often observed with surgical emphysema. There was slight asymmetry of the oropharyngeal tissues with more prominence on the right side (Figure 3), however, the extraction site showed no obvious breakdown and appeared as expected (Figure 4). A cone beam computed tomography (CBCT) scan was taken to confirm the clinical diagnosis and establish the tissue planes involved. The scanned volume was from the level of the orbits to the hyoid bone. It demonstrated gas tracking superiorly to the right buccal space and up to the right infratemporal and temporal fossa (Figure 5A). The gas was seen to surround the right masticatory space with a notable amount of gas in the right parapharyngeal space (Figure 5B). It crossed the midline and tracked inferiorly in the retropharyngeal space. Gas was present in bilateral submandibular spaces and deep to both sternocleidomastoid muscles. It was not possible to identify the inferior extent of the surgical emphysema as the gas was seen to extend into the infra-hyoid neck, which was not included



**Figure 3** Image showing asymmetry of the oropharyngeal tissues with more prominence on the right side.



**Figure 4** Extraction site of lower right third molar.



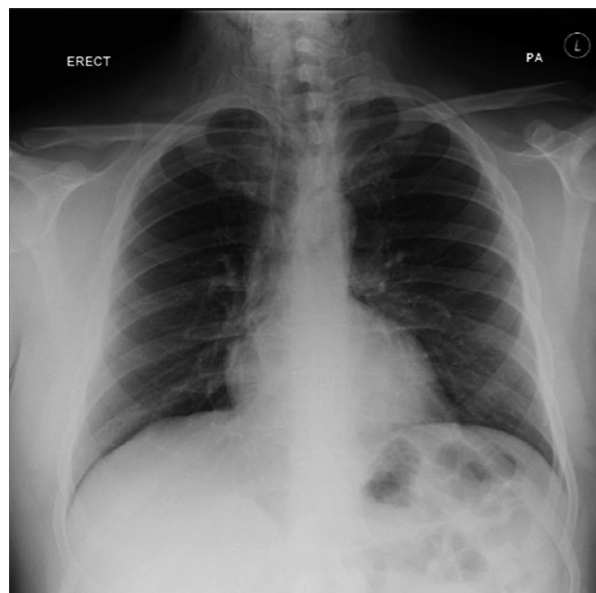
**Figure 5** (A) Axial slice of cone beam computed tomography (CBCT) demonstrating gas in the right temporal fossa. (B) Axial slice of CBCT demonstrating gas surrounding the right masticatory space with a notable amount of gas in the right parapharyngeal space. (C) Axial slice of CBCT demonstrating gas in the retropharyngeal space, bilateral submandibular spaces and deep to both sternocleidomastoid muscles. (D) Coronal slice of CBCT showing the extraction site with lingual and buccal plates intact.

within the scanned volume (Figure 5C). The coronal slice of the CBCT shows the extraction site with lingual and buccal plates intact (Figure 5D).

The Oral Surgery Consultant liaised with the Accident and emergency department to arrange admission for thoracic CT to exclude pneumomediastinum and for subsequent monitoring. A posteroanterior chest radiograph was undertaken (Figure 6). This showed gas extending to the right supraclavicular fossa. It did not show any overt evidence of a pneumomediastinum therefore no thoracic CT was thought to be necessary.

## Management

Immediate management included close observation in the dental hospital. After 2 h the patient was transferred to the emergency department, where he was admitted for ongoing observation for 4 h. An ENT surgeon also assessed the patient, undertaking a flexible nasolaryngoscopy examination. This demonstrated mobile vocal cords and confirmed that there



**Figure 6** Posteroanterior (PA) chest radiograph showing gas extending to the right supraclavicular fossa.

was no acute airway compromise. He was discharged with a 7-day course of prophylactic oral antibiotics (co-amoxiclav and metronidazole). The swelling reduced and the emphysema resolved after several days. The patient's voice returned to normal.

## Discussion

This was an unusual case of surgical emphysema due to its atypical cause from innocuous patient activity. However, iatrogenic causes of surgical emphysema are well-reported in the literature<sup>2–11</sup>, and the importance of good practice should always be stressed to prevent such cases<sup>5</sup>. General dental practitioners should consider referral to specialist services if they suspect that a tooth extraction may require surgical removal and they are not equipped with suitable surgical drill hand-pieces.

It should be noted that although no air turbine drill was used, there was a breach of the epithelium and therefore the potential to develop surgical emphysema was present. Similar cases of surgical emphysema have been seen in patients blowing their nose, coughing excessively and vomiting following dental extractions<sup>5</sup>. Consideration should be taken during post-operative instructions to emphasise the avoidance of activities that cause an increase in pressure in the mouth. Such activities might include blowing one's nose, drinking through a straw and even 'blowing raspberries'.

Although undoubtedly more commonly associated with dental extractions, there have been reported cases of surgical emphysema as a complication following non-surgical endodontic treatment, tooth polishing and coronectomy procedures<sup>6,7,9</sup>. Methods used in these procedures may breach the epithelium and therefore the risk of surgical emphysema is present, albeit low. In coronectomy procedures the use of surgical drills is encouraged, instead of high-speed air turbine drills, to reduce the risk of surgical emphysema. Similarly, blowing air with a 3-in-1 syringe into a surgical site or root canal system should also be discouraged.

Dental treatment is not the sole cause of surgical emphysema. Often facial fractures with post-trauma activity, such as nose blowing, have been associated with this complication<sup>12</sup>.

Antibiotic prophylaxis is usually given in the management of surgical emphysema due to the potential for spread and serious complications. The condition is often self-resolving with minimal complications<sup>5,10</sup>. When clinicians are considering giving antibiotic prophylaxis they should judge each case

on its own merit, including the extent of spread and risk of infection.

Prompt recognition by thorough history taking and clinical examination is important. In this case, the diagnosis of surgical emphysema was suspected early and confirmed with imaging. However, the signs and symptoms can be mistaken for an allergic reaction<sup>11</sup>. Crepitus on palpation is a common finding of surgical emphysema and this should raise suspicion when observed in a patient. The use of the CT scan can help with identifying spaces involved and associated risks. In our case, CBCT was the only applicable imaging immediately available in our dental clinic and this helped to identify some of the tissue planes involved. We did refer the patient for thoracic CT to ensure no mediastinal involvement but the A&E Consultant felt that this was unnecessary following plain chest x-ray. In situations where a CBCT is not available we would suggest immediate referral to the local A&E department for CT.

We hope that clinicians can learn from this case that even with seemingly uncomplicated, minimally invasive procedures, surgical emphysema should be within the differential diagnosis with a sudden acute post-operative swelling.

## Conflicts of interest

The authors declare that there is no conflict of interest and there has been no source of funding.

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